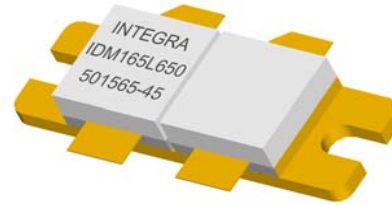


VHF-Band Pulsed Power Transistor

The high power pulsed transistor part number IDM165L650 is designed for VHF-Band systems operating at 125-167 MHz. Operating at a pulse width of 1ms with a duty factor of 20%, this dual MOSFET device supplies a minimum of 650 watts of peak pulse power at a fixed input power of 80 watts across the instantaneous operating bandwidth of 125-167 MHz. All devices are 100% screened for large signal RF parameters in the broadband RF test fixture across the entire specified operating bandwidth with no variable or external tuning.



Silicon MOSFET

- High Power Gain
- Superior thermal stability

Class B Operation

- Gate biased to $I_{DQ}=0mA$

Configuration

- Dual In-phase operation
- Common Source

Gold Metal

- Maximum Reliability

BeO Package

- Unmatched Thermal Reliability

Epoxy Sealed Lid

- Gross Leak Qualified

RF Test Fixture

- Broadband
- Matched to 50Ω
- Long-term Correlation Maintained
- 100% Device RF Screening
- No External Tuning Allowed

TYPICAL DATA TYPICAL DATA TYPICAL DATA TYPICAL DATA

| <u>Device</u> | <u>Freq (MHz)</u> | <u>V_{DD} (V)</u> | <u>P_{IN} (W)</u> | <u>IRL (dB)</u> | <u>P_{OUT} (W)</u> | <u>G_P (dB)</u> | <u>I_D (A)</u> | <u>N_D (%)</u> | <u>Droop (dB)</u> | <u>P_{OUT} @ P_{IN}+1dB (W)</u> |
|---------------|-------------------|---------------------------|---------------------------|-----------------|----------------------------|---------------------------|--------------------------|--------------------------|-------------------|---|
| 1273-16 | 125 | 34 | 80 | 14 | 763 | 9.8 | 35.0 | 64 | -0.39 | 813 |
| | 146 | 34 | 80 | 21 | 689 | 9.5 | 32.7 | 62 | -0.40 | 718 |
| | 167 | 34 | 80 | 12 | 660 | 9.2 | 31.0 | 63 | -0.38 | 729 |

Pulse Duration = 1msec
 Duty Factor = 20%
 $I_{DQ} = 0mA$

MAXIMUM RATINGS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|--|-----------|-----|------|-------|-----------------|
| BD | Drain-Source Voltage | V_{DS} | -- | 80 | V | -- |
| BD | Emitter-Base Voltage | V_{GS} | -- | 20 | V | -- |
| BD | Storage Temperature Range | T_{STG} | -55 | +150 | °C | -- |
| BD | Operating Junction Temperature Range | T_J | -55 | +200 | °C | -- |
| Note | Screen 'BD' = parameter qualified By Design. | | | | | |

THERMAL CHARACTERISTICS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|--|--------------|-----|------|-------|--|
| BD | Thermal Resistance | $R_{TH(JC)}$ | -- | 0.25 | °C/W | $V_{DD}=V1, I_{DQ}=0mA, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{OUT}=650W.$ |
| Note | Screen 'BD' = parameter qualified By Design. | | | | | |

PROCESSING SPECIFICATIONS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|--|--------|-----|-----|-------|---|
| 100% | DC Wafer Probe | -- | -- | -- | -- | Per Integra specification. |
| Q1 | Wafer DC and RF Qualification | -- | -- | -- | -- | Per Integra specification. |
| LM | Wire Bond Strength | -- | -- | -- | -- | Line monitor per Integra specification. |
| 100% | Pre-cap visual inspection | -- | -- | -- | -- | Per Integra specification. |
| 100% | Gross leak test | -- | -- | -- | -- | MIL-STD-750D, Method 1071, Test Condition C |
| Note | Screen 'Q1' = parameter is qualified by assembly and test of 3 pieces minimum per wafer. | | | | | |
| Note | Screen 'LM' = parameter is qualified by assembly line monitor. | | | | | |

DC ELECTRICAL CHARACTERISTICS

| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|--|-------------|-----|-----|-------|---|
| 100% | Drain-Source Breakdown Voltage (each side) | BV_{DSS} | 80 | -- | V | $I_D=50mA, V_{GS}=0V, T_F=25\pm5^\circ C.$ |
| 100% | Drain Leakage Current (each side) | I_{DSS} | -- | 5 | mA | $V_{DS}=34V, V_{GS}=0V, T_F=25\pm5^\circ C.$ |
| 100% | Gate Threshold Voltage 1 (each side) | V_{Gsth1} | 1.0 | -- | V | $I_D=100\mu A, V_{GS}=10V, T_F=25\pm5^\circ C.$ |
| 100% | Gate Threshold Voltage 2 (each side) | V_{Gsth2} | 2.0 | -- | V | $I_D=50mA, V_{GS}=10V, T_F=25\pm5^\circ C.$ |

RF ELECTRICAL CHARACTERISTICS

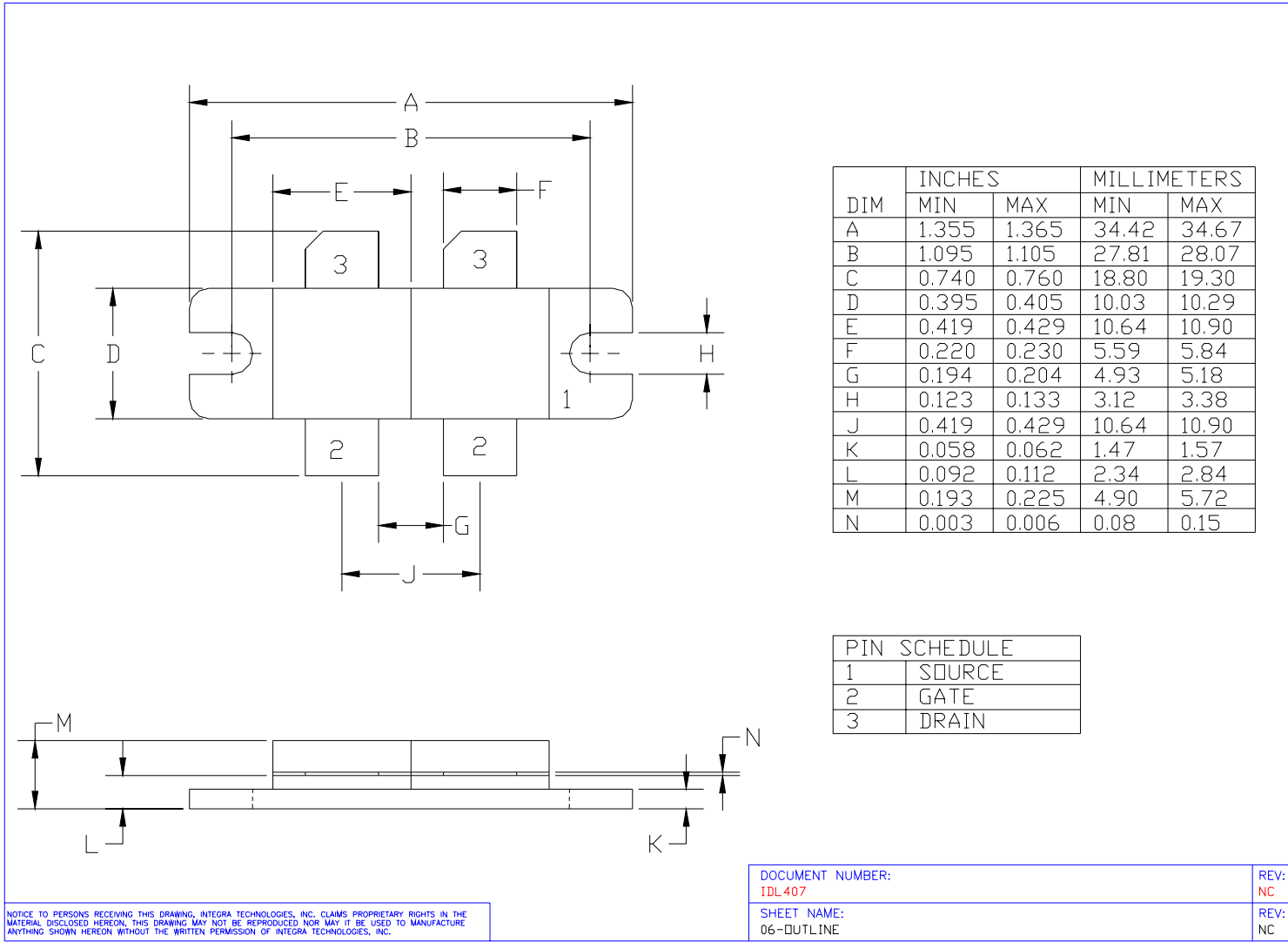
| Screen | Parameter | Symbol | Min | Max | Units | Test Conditions |
|--------|---|--------|-----|-----|-------|--|
| 100% | Input Return Loss | IRL | 10 | -- | dB | $V_{DD}=V1, I_{DQ}=0mA, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1, F2, F3.$ |
| 100% | Output Power | P_O | 650 | -- | W | $V_{DD}=V1, I_{DQ}=0mA, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1, F2, F3.$ |
| 100% | Drain Efficiency ($P_O/I_D/V_{DD}$) | N_D | 40 | -- | % | $V_{DD}=V1, I_{DQ}=0mA, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1, F2, F3.$ |
| 100% | Pulse Amplitude Droop | D | -- | 1.0 | dB | $V_{DD}=V1, I_{DQ}=0mA, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1, F2, F3.$ Measure between 100us and 900us time positions. |
| 100% | Power Gain | G_P | 9.1 | -- | dB | $V_{DD}=V1, I_{DQ}=0mA, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1, F2, F3.$ |
| 100% | Gain Flatness versus Frequency | GF | -- | 1.2 | dB | $GF = MAX(G_P) - MIN(G_P).$ |
| 100% | Stability into 2:1 VSWR | VSWR-S | S | -- | -- | $V_{DD}=V1, I_{DQ}=0mA, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1, F2, F3.$ Rotate 2:1 output VSWR through 360° phase. No oscillatory or pulse break-up characteristics allowed on detected output pulse. |
| 100% | 3:1 Load Mismatch Tolerance | LMT | P | -- | -- | $V_{DD}=V1, I_{DQ}=0mA, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1, F2, F3.$ Rotate 3:1 output VSWR through 360° phase. Post test $P_O =$ Pre test $P_O \pm 10W.$ |
| 100% | Overdrive Stability | OD-S | S | -- | -- | $V_{DD}=V1, I_{DQ}=0mA, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN2}, F=F1, F2, F3.$ No oscillatory or pulse break-up characteristics allowed on detected output pulse. |
| Note | $V1 = 34V; PW1 = 1ms; DF1 = 20%; P_{IN1} = 80W; P_{IN2} = 100W; F1 = 125MHz, F2 = 146MHz, F3 = 167MHz.$ | | | | | |
| Note | $T_F =$ Device flange temperature. | | | | | |

BROADBAND RF TEST FIXTURE IMPEDANCE CHARACTERISTICS

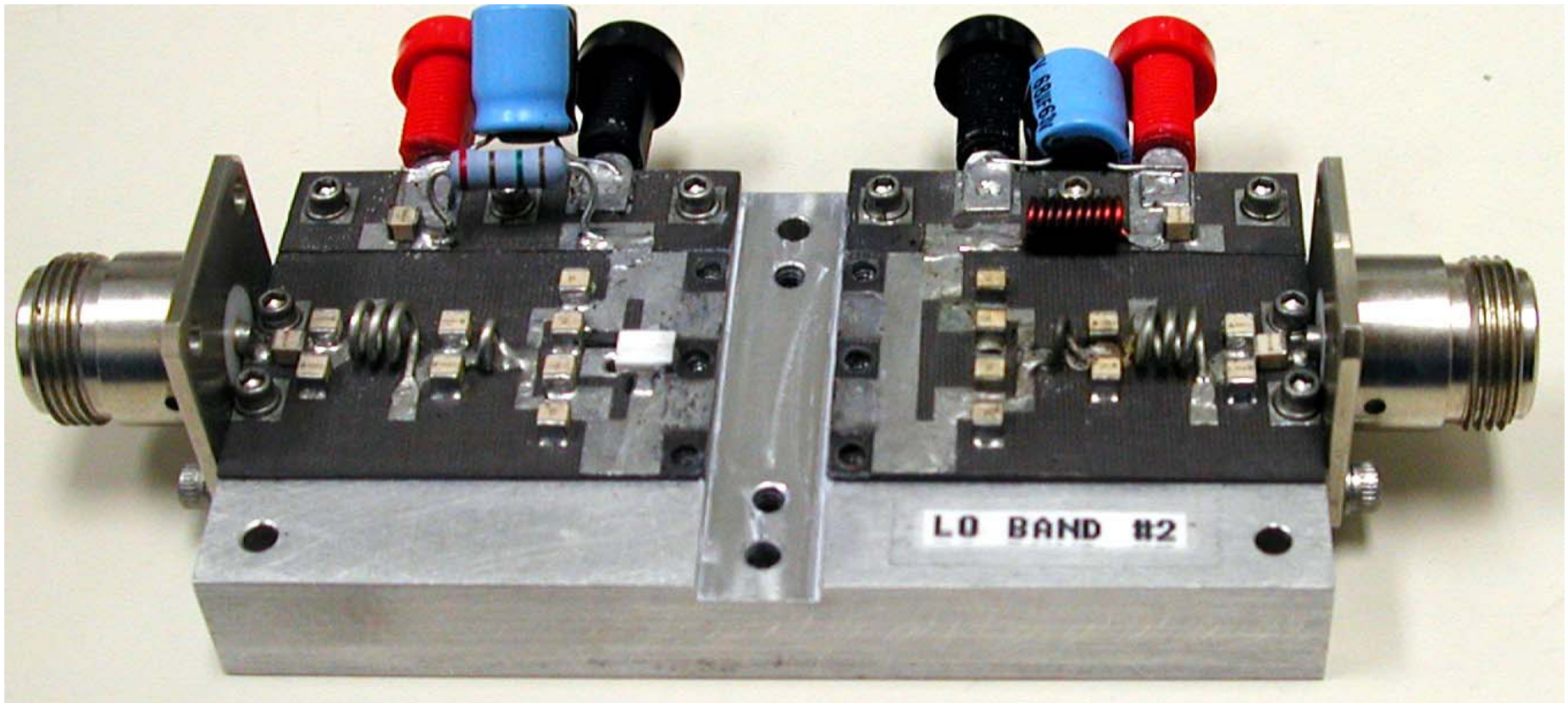
| Frequency (MHz) | $Z_{IF} (\Omega)$ | $Z_{OF} (\Omega)$ |
|-----------------|-------------------|-------------------|
| 125 | 1.558 + j0.013 | 1.632 + j0.035 |
| 146 | 1.565 + j0.157 | 1.760 + j0.105 |
| 167 | 1.248 + j0.698 | 1.415 + j0.484 |

| | | |
|----------------------|--|--|
| Impedance Definition | | |
|----------------------|--|--|

PACKAGE DIMENSIONAL OUTLINE DRAWING

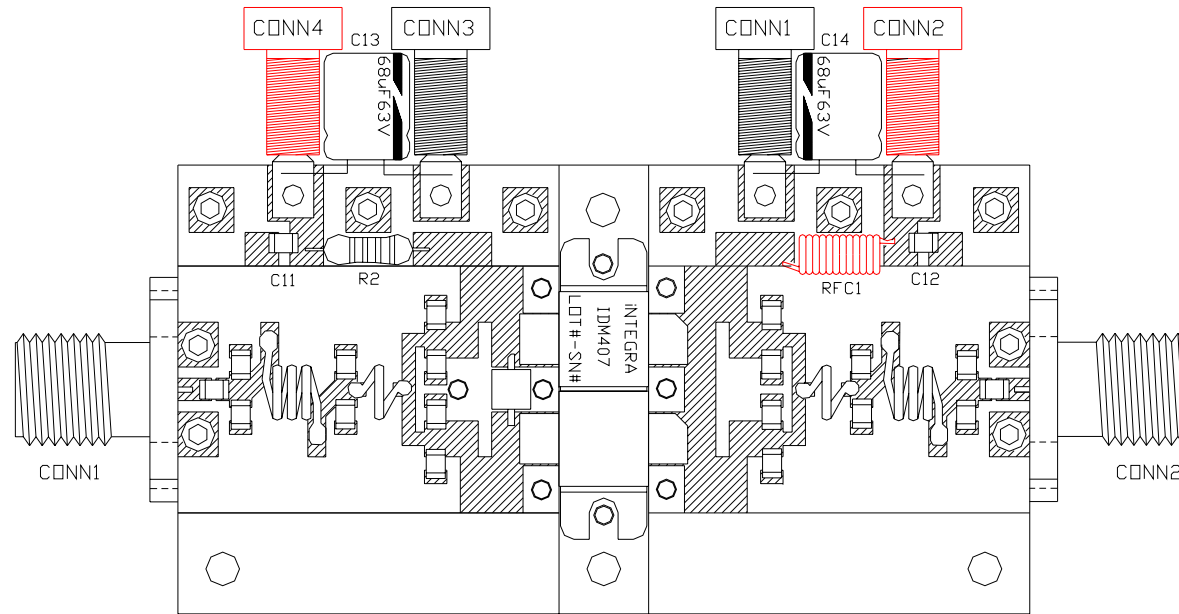


BROADBAND RF TEST FIXTURE



PHOTOGRAPH

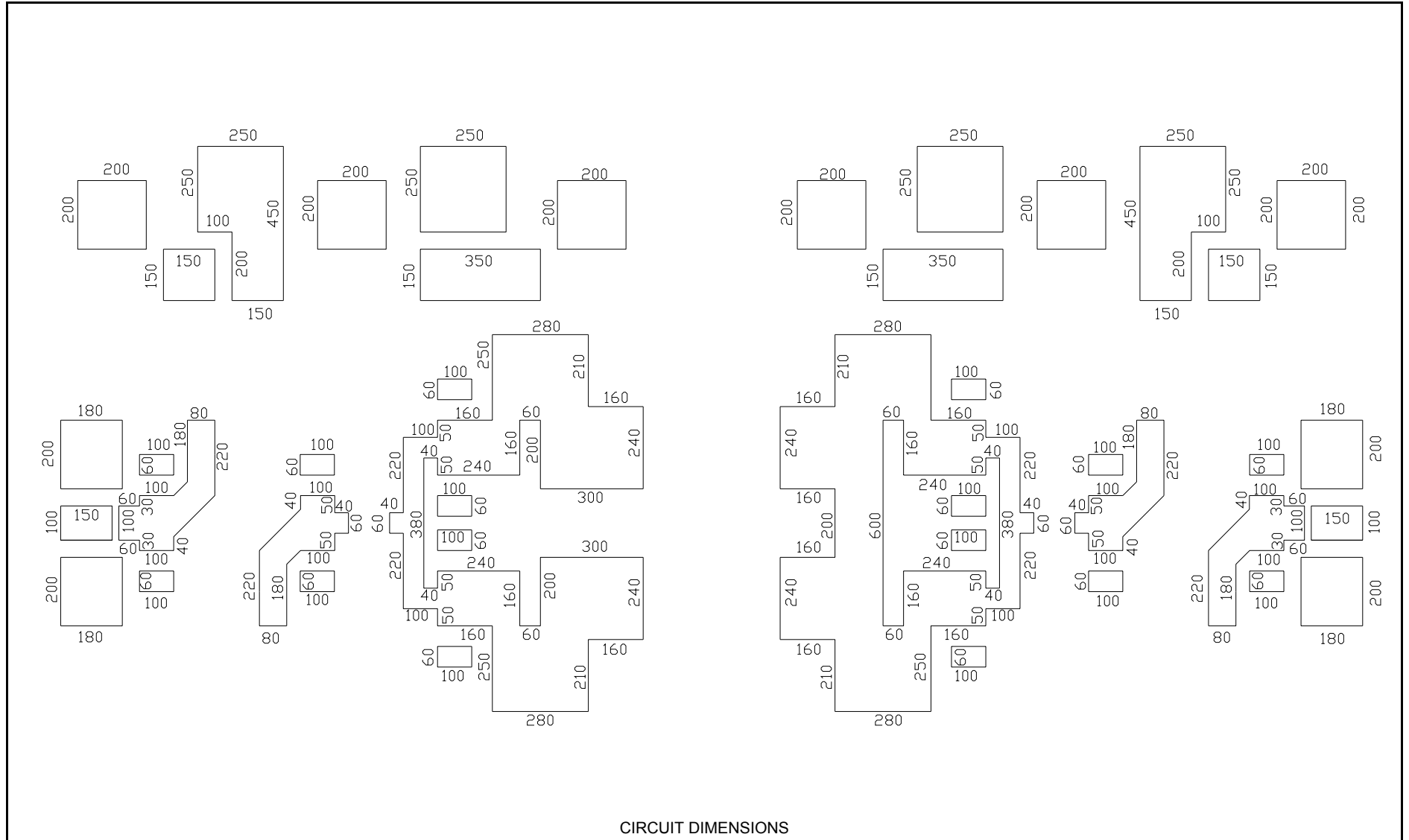
BROADBAND RF TEST FIXTURE



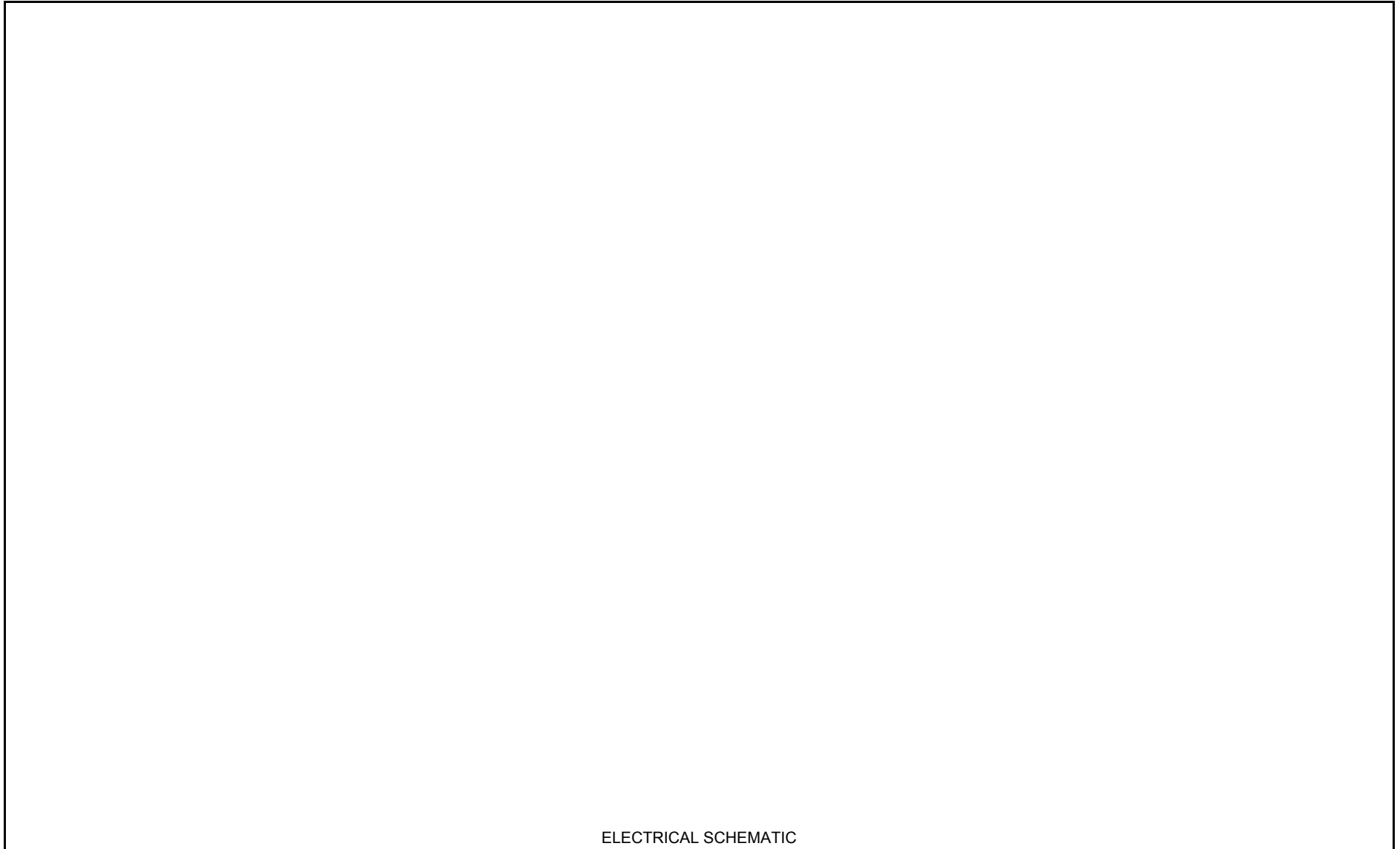
| COMPONENT | DESCRIPTION |
|------------------|--|
| DUT | TRANSISTOR #IDM407, MOUNT HARD TO THE RIGHT |
| PC BOARD | DAK 601, TH=0.031", Dk=2.54 |
| C1, C10 | ATC, 100B, 561Kw (560pF) |
| L1, L12 | 3 TURNS #18 WIRE, 0.120 ID |
| L2, L11 | 1 TURN, #18 WIRE, 0.110 ID |
| C2, C9 | 1x ATC, 100B, 220JW + 1x ATC, 100B, 200J |
| L3-L10 | SEE MICROSTRIP DIMENSIONS |
| C11, C12 | ATC, 100B, 820pF |
| C3, C8 | 2x ATC, 100B, 101JW (100pF) |
| C4,C5,C6,C7 | 2x ATC, 100B, 181JW (180pF) |
| R1 | INTEGRA RES1-02 |
| R2 | 150 ohm, 0.5 WATT RESISTOR |
| RFC1 | 10 TURNS, #20 WIRE, 0.110 ID |
| DC CONN 1, 3 | BANANA JACK, BLACK |
| DC CONN 2, 4 | BANANA JACK, RED |
| TRANSISTOR CLAMP | NDRYL CLAMP - 06 |
| CONN1, CONN2 | N TYPE CONNECTORS |
| NOTE | FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST |

ASSEMBLY AND PARTS LIST

BROADBAND RF TEST FIXTURE



BROADBAND RF TEST FIXTURE



ELECTRICAL SCHEMATIC

DEFINITIONS

Data Sheet Status

| | |
|---------------------------|---|
| Proposed Specification | This data sheet contains proposed specifications. |
| Preliminary Specification | This data sheet contains specifications based on preliminary measurements and data. |
| Product Specification | This data sheet contains final product specifications. |

Maximum Ratings

Stress above one or more of the maximum ratings may cause permanent damage to the device. These are maximum ratings only and operation of the device at these or at any other conditions above those given in the characteristics sections of the specification is not implied. Exposure to maximum values for extended periods of time may affect device reliability.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO base is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with general or domestic waste.

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